

End, one portion entered the Irish Sea, and by September had reached as far north as the Cardigan Bay and south Arklow light-ships. The other part of the shoal passed along the south coast of Ireland, and was observed in November as far along the west coast of Ireland as Galway Bay. The disappearance of the shoal from the Irish Sea in September is attributed to the southerly flow of water from that area into the Channel blocking its further northerly migration. It is shown that the shoal must have entered the Irish Sea from the south, for plankton collections taken from the Bahama light-ship in the north of that area did not contain the organism, which could not, therefore, have passed through the north channel. The paper is illustrated by charts which show the distribution of *Muggiæa* from month to month during the year 1904.

The volume of *Rapports* is noteworthy only because of a statement made by Mr. Archer, the English Chief Inspector of Fisheries, at one of the "reunions," that it is the wish of the British Government "that no tasks should be undertaken or interests created the conclusion of which could not be reasonably looked for by July, 1907," since it is not the intention of the Government to continue the large expenditure involved beyond the five years originally contemplated. It is very probable, then, that the British share of the work will cease in the course of another year, and that with the withdrawal of this country the international investigations will come to a close.

It has, indeed, been apparent for some time past that the International Organisation, as at present constituted, could not continue on a permanent basis. For the last five years it has been necessary to maintain, at a very great expense, the Bureau at Copenhagen, the Central Laboratory at Christiania; and a complex system of "reunions" of the council, the "commissions," the "special commissions," and "sections." All this organisation was no doubt necessary, in the first instance, to bring together those engaged in the work, and to secure the necessary coordination in the hydrographical investigations. But since this preliminary organisation must now have been completed, it is desirable in any case that some simpler and less expensive means of coordination should have been evolved. It should be remembered that the international scheme of investigations originally included fishery research proper, hydrographical investigations, and, though this has never been stated in so many words, the promotion of international agreement with respect to the observance of "closed areas," such as the Moray Firth, and the regulation of fishing on the high seas. With regard to the latter point one cannot speak at present, but it may be pointed out that fishery legislation on an international scale has been notoriously difficult to obtain in the past, and that the chances of securing this at the present time ought not to be jeopardised by the unconditional withdrawal of Great Britain from the scheme of international work. Purely fishery investigations need not be imperilled by any such action. There does not appear to be any real advantage in the prosecution of these on an international scale. No amount of research carried out in another area than our own will relieve us of the necessity of investigating fishery questions locally with respect to the special economic and legislative problems involved. Fishery research with regard to such issues as the protection of immature fishes, closed areas and closed seasons, the regulation of fishing methods, and the like, must be carried on if fishery restrictions are ever to be more than an expensive and vexatious interference with the legitimate operations of our fishermen. If a fair proportion of the annual grant at

present made to the International Organisation is in the future made to supplement the efforts of existing fishery research institutions, with, of course, proper Government inspection, then the withdrawal of our Government from the international scheme need cause no apprehensions.

It is different with regard to the hydrographical investigations. If these are to be carried on at all it must be on an international scale, and with proper coordination as regards methods and publication of results. Quite apart from the assistance which such research is likely to afford meteorological science, it seems now to be certain that it is sure to throw light on the ultimate causes which affect the shoaling movements and migrations of food fishes. There is really no good reason why, even if the fishery investigations of the International Organisation be dropped, the hydrographical work should not go on. The present hydrographical cruises could be continued by the national staffs; and methods having already been worked out, the coordination of the work and the publication, in a uniform style, of the results need entail no great expense. The international conferences which have become so marked a feature of fishery affairs, both on the administrative and scientific sides, might be dispensed with, and no really useful object would be sacrificed.

NOTES.

THE council of the Society of Arts has awarded the Albert medal for the present year to Sir Joseph W. Swan, F.R.S., "for the important part he took in the invention of the incandescent electric lamp, and for his invention of the carbon process of photographic printing."

A LARGE physical laboratory is, the *Pioneer Mail* states, to be built by the Punjab Education Department in Lahore on the present camping-ground of the Public Works Department, as soon as the new Public Works offices are constructed.

THE *British Medical Journal* states that a general institute of psychology specially intended for the study of the phenomena of subconsciousness, the investigation of the causes of criminality, and the discovery of means of curing social evils will shortly be formally constituted in Paris. Among those to whom the initiation of the scheme is mainly due are Profs. Brouardel, d'Arsonval, and Gariel, and MM. Broux, Giard, and A. Picard.

WE notice with regret the announcement of the death, at eighty-three years of age, of M. Raphael Bischoffsheim, honorary member of the Paris Academy of Sciences. M. Bischoffsheim was a generous benefactor to science. He contributed largely to the Pic du Midi Observatory, bore the expense of the great equatorial at Paris Observatory, gave largely to the Montsouris Observatory, and founded the fine observatory at Nice. He was elected a member of the Institut de France in 1890 in succession to M. Cosson.

A COMMITTEE has been formed with the object of establishing a memorial of the late Sir William Wharton, K.C.B., F.R.S., whose death at Cape Town in September last was a sad incident of the British Association meeting in South Africa. For a long period Sir William Wharton filled with distinguished ability the important post of hydrographer to the Navy, and the committee has decided that the most appropriate testimonial would be such as would follow the same lines and exist for the same purpose as the Beaufort testimonial, which is awarded as a prize to the officer who has distinguished himself as having passed the best ex-

amination in mathematics and nautical astronomy for lieutenant in his year. This Sir William Wharton won in the year 1865. By the proposed arrangement two awards for the same object would be given under the names of "The Beaufort Testimonial" and "The Wharton Testimonial," thus associating the names of the two eminent hydrographers who have served for the longest periods in that capacity. It is proposed in addition, if the funds admit, to present a medal, having on the obverse a bust of the late Sir William Wharton, and on the reverse a suitable inscription. The committee includes Vice-Admiral Sir Charles Drury, K.C.B., K.C.S.I.; Captain A. Mostyn Field, F.R.S.; Vice-Admiral Swinton C. Holland; Admiral of the Fleet Sir F. Richards, G.C.B.; and Captain T. H. Tizzard, C.B., F.R.S. Messrs. Coutts and Company, Bankers, 440 Strand, London, have arranged to receive contributions to the fund.

On May 25 Lord Avebury presided at the annual *conversazione* of the Selborne Society and delivered his presidential address. He spoke of the coming of age of the society, of the interest which many members were taking in the forthcoming "Country in Town" Exhibition, and of the bird sanctuary maintained by the Ealing branch. He also alluded to the destruction of roadside beauty, to the way in which ladies prefer the authority of shopkeepers to that of ornithologists with regard to "artificial ospreys" so called, and to the injury to birds, which gamekeepers still continue to do. In the latter part of his remarks Lord Avebury dwelt upon the manner in which the study of nature adds to the happiness of life. Nearly 700 guests were present, and there was a large number of interesting exhibits, including some fifty microscopes exhibited by members of the Royal Microscopical Society, the Quckett Club, and other institutions.

MESSRS. R. B. Woosnam, D. Carruthers, and A. F. R. Wollaston, three members of the zoological expedition sent to Africa under the auspices of the Natural History Museum, South Kensington, have made the following ascents in the Ruwenzori range. On April 1 they ascended Duwoni, the peak rising to the north-east of the Mubuku Glacier. This peak has two tops of apparently equal altitude; the southern top, which was reached, was found to be 15,893 feet. On April 3 they ascended Kiyanja, the peak at the western end of the Mubuku group of peaks. The altitude was found to be 16,379 feet. (The altitudes were taken by aneroid and by the boiling-point thermometer.) Both these peaks have been thought by different explorers to be the highest points in Ruwenzori, but from the summit of Kiyanja a still higher peak with two tops was seen in a north-westerly direction. The weather at this season of the year is very unfavourable, the mountains being almost constantly buried in clouds with frequent snowstorms, which prevented the party from making further explorations.

On Friday last, June 1, the Secretary for Scotland received a deputation of the Royal Scottish Geographical Society, laying before him the claims of the society in connection with the proposed National Galleries Bill (see p. 137). The deputation was introduced by Mr. C. E. Price, M.P., and the society's position and claims were explained by Prof. Geikie (president), Mr. W. B. Blaikie, Dr. George Smith, Mr. W. C. Smith, K.C., and Mr. Ralph Richardson. The national character of the society was touched upon, as also the important work it did in fostering the study of geography, in providing lectures by eminent travellers in the four great centres of population, and in giving facilities for the inspection of maps and

valuable geographical works. It was claimed that the society should be recognised officially as one of the scientific societies of Scotland, to be provided with premises free of rent (at present 120*l.* is paid in rent), to have a grant from State funds, and to be represented on the new Board of Trustees. Reference was also made to the present endeavour to found a chair of geography in the University of Edinburgh. The Secretary for Scotland in reply thanked the members of the deputation for their presence, and pointed out that their memorial went further than the recommendation of the departmental committee which recommended the remission of the rent of 120*l.* which the society pays for its accommodation in the National Portrait Gallery. He was not sure that this was a convenient time to urge the Government to further expenditure, but he would not fail to take into serious consideration all that had been urged in the interests of the society.

We regret to announce the death on May 29 of Dr. William Fream, who since 1894 acted as the agricultural correspondent of the *Times*, and was formerly a frequent contributor to our columns. Born in 1854, Dr. Fream was educated at the Royal College of Science, Dublin, and became professor of natural history at the Royal Agricultural College at Cirencester. After lecturing for a time on botany at the Guy's Hospital Medical School he became professor at the Downton College of Agriculture. Later he was chiefly engaged in writing, and for ten years acted as editor of the *Journal of the Royal Agricultural Society*. His best-known books were one on the Rothamsted experiments and his "Elements of Agriculture," written for the Royal Agricultural Society, which reached its seventh edition last year. Dr. Fream will be remembered for the part he took in a controversy as to the merits of perennial rye grass in pastures, a controversy which cannot yet be regarded as settled. Mr. Faunce de Laune, and with him Mr. Carruthers, maintained that rye grass was neglected by stock, and should be excluded from any mixture used for sowing down land to grass. Dr. Fream, however, by growing pieces of turf selected from the most famous pastures in the country, demonstrated that rye grass was a large constituent of such good grass land, and in consequence argued strongly in favour of the high opinion in which this grass has always been held by practical farmers.

PRELIMINARY arrangements have been made for the establishment of a great marine museum in New York with an astronomical museum as an adjunct to it. The New York Observatory and Nautical Museum will, according to *Science*, have an endowment of not less than 100,000*l.*, and, in addition to this, it is expected that the city of New York will provide a site in Bronx Park adjacent to the botanical garden and zoological park, and will also erect the museum building and the domes and smaller buildings for the observatory. In the nautical museum will be collected and exhibited models of all types of vessels, safety and signal devices, nautical instruments and methods of determining position, charts, marine engines and motors, and historic instruments and relics. The museum and collections will be arranged so that properly qualified persons can avail themselves of the facilities there offered for investigation and research. The observatory will be provided with a great telescope, for photographic and visual work, astrophysical instruments for the investigation of solar problems, magnetometers, seismographs, and other necessary instruments. A time service will be instituted so that chronometers may be rated, marine instruments will be tested, and tidal investigations will be inaugurated.

COMMENTING upon Mr. Southerden's letter on "Carbon Dioxide in the Breath," published in *NATURE* for May 24 (p. 21), Mr. E. A. Parkyn writes to direct attention to the well-recognised fact that the presence of 0.06 per cent. of carbon dioxide in the atmosphere need not be injurious, but that the gas is generally found in bad company, for an increase of carbon dioxide is almost invariably accompanied by a corresponding increase of organic impurity. In other words, the importance attaching to the rise of carbon dioxide to 0.06 per cent. is a true indication of the vitiation of the air by organic matter given out during respiration.

A COMMUNICATION from the Zi-ka-wei Observatory, near Shanghai, informs us that the great San Francisco earthquake was registered by the seismographs there. The shocks were fairly strong, and they lasted a little more than 1h. 34m. The first preliminary tremors, transmitted through the mass of the globe, began at 9h. 35m. os. p.m. Chinese coast time. The first large waves, travelling along the crust, on an arc of a great circle, were felt at 9h. 55m. 54s. The last waves of decreasing amplitude left their trace at 10h. 31m. 35s. p.m., and the last slight movements of the ground died away at 11h. 9m. 44s. p.m. April 18. These records should be of service in determining the velocity of propagation of the seismic undulations by connecting them with observations of the exact minute and second of the occurrence at San Francisco.

MR. CHARLES VAN NORDEN, writing from East Auburn, California, U.S.A., says that he was on the fourth floor of the Palace Hotel, San Francisco, on April 18, when the disastrous earthquake occurred. The movement seemed from south to north, and the rocking of the massive walls of the hotel was so violent that its continuance even for a few seconds seemed impossible. To Mr. Norden, who was in bed, the motion seemed like that of a small rowing boat on a choppy sea. The shock occurred at 5.13 a.m., and at 6 a.m. Mr. Norden had left San Francisco by the ferry boat for Oakland. While sitting on the deck of the ferry boat, looking at the many fires gathering together in a great conflagration, he noticed a thunder-cloud—a white, cumulous mass, dark at the bottom—hanging over the city. The morning was clear and mild for San Francisco, and no other cloud was in sight. None of the descriptions of the catastrophe mentions this feature, and Mr. Norden is curious to know if other observations were made of it.

AN excellent little *résumé*, by Mr. D. J. Scourfield, of the leading features and possible developments of Mendel's law of heredity appears in the Proceedings of the South London Entomological and Natural History Society for 1905-6. Other articles are devoted to the British plume-moths, the lengthened pupa-stage of certain Lepidoptera, and notes on Hawaiian entomology.

THE contents of the *Sitzungsberichte und Abhandlungen* of the Dresden Isis for the second half of 1905 include an article by Prof. O. Drude on the meaning and scope of the term *oecology* (*ökologie*), or the manifestations of plant and animal life in regard to the struggle for space (or existence) in connection with climate and other external influences. Mr. H. Engelhardt contributes an illustrated article on the Tertiary flora of Chili.

A STRIKING instance of increased patronage due to the adoption of "popular prices" is recorded by Captain Stanley Flower in his report of the Giza Zoological Gardens for the past year. By the reduction of the gate-money the number of visitors to the garden leaped up from 64,711 in

the previous year to 177,587, an excess of 112,876 over any other year. The receipts showed, however, but a comparatively small increase—£E.1402 against £E.1388 in 1904. The stock of animals has been largely increased, and a notable new feature in the gardens is the formation of an extensive enclosure, where a number of the larger birds of the Nile Valley are allowed to roam at comparative liberty.

OLD churchwardens' accounts of various Bedfordshire parishes have been utilised by Mr. J. Steele-Elliott, for an article which appears in the May number of the *Zoologist*, to afford information with regard to the fauna of the county during the last two and a half centuries. The entries cited refer to sums paid for the destruction of "vermin." The absence of mention of birds of prey is noticeable, as is the infrequent occurrence of rats, but special interest attaches to certain entries referring to martens. Polecats were evidently once abundant, and it is curious to note the persistent war waged against the hedgehog—probably on account of its supposed milk-sucking propensities. Mr. Heneage Cocks refers, in the same issue, to an artificial cave at Park Place, Remenham, Berks, which forms the abode of a number of bats, some belonging to rare species, including *Myotis bechsteini*.

WE have received seven parts (Nos. 1448, 1449, and 1452 to 1456) of the Proceedings of the U.S. National Museum, which include descriptions of Japanese Hymenoptera and of South American geometrid moths and grasshoppers, as well as of two American river-mussels; fully illustrated notes on molluscs of the family Pyramidellidae from Japan, America, and the intermediate areas; a synopsis of Japanese sturgeons; and an account of the osteology of the creodont carnivorous mammals of the genus *Sinopa*. The latter genus, which occurs in the Lower and Middle Eocene of North America, according to Mr. W. D. Matthew, may be regarded as an extremely primitive form, with cheek-teeth of the opossum-type, from which have been evolved the more specialised *Cynohyænodon*, *Pterodon*, and *Hyænodon* of the Oligocene. Japanese sturgeons are, it appears, represented only by two species. Of the Pyramidellidae, Messrs. Dall and Bartsch name a number of new species, and also figure others.

THE application of De Vries's mutation-theory to molluscs forms the subject of an article by Mr. F. C. Baker in the May number of the *American Naturalist*. The shells selected for observation are fresh-water snails, more especially *Limnæa* and *Valvata*, the former of which is well known to be an exceedingly variable or "unstable" type. Series of specimens of *Limnæa* from particular localities are figured to exhibit the range of variation, which is so great that the extreme forms, if isolated, would be allowed specific rank. Special attention is directed to the sudden development of an apparently new species in a newly-formed pond in the United States. While the mutation-theory seems to account more satisfactorily than any other for these variations, the author deprecates haste in applying a hypothesis founded upon plant-variation to animal life. In the same issue Dr. E. A. Andrews discusses the mode in which American crayfish of the genus *Cambarus* lay their eggs. The first process is the careful cleansing of the lower surface of the body preparatory to the extrusion of a glairy substance from the "cement-glands" in which the eggs are afterwards laid. During oviposition the female lies supine and externally inert, but after this occurs a long, rhythmic alternation of poses connected with the fastening of the eggs to the abdominal appendages.

THE *Haslemere Museum Gazette* is the title of a new serial published by the institution the name of which it bears, and to be issued in monthly parts at the price of sixpence. The Haslemere Museum specially devotes itself to education at first-hand, that is to say, by inculcating familiarity with actual specimens rather than the cultivation of mere book-knowledge. One of the objects of the new journal is to assist and amplify this excellent conception. It is proposed to refer in turn to the chief museums in London (including those devoted to art), the Zoological Society's Gardens, &c., and to direct the attention of readers to some of the most noteworthy objects in each. By this means—without in any way usurping the function of a "guide"—it is urged that the educational value of such establishments will be largely increased. Nor will nature itself be neglected, as is demonstrated by the frontispiece, representing two oaks growing under similar conditions, but one with and the other without leaves. Excellent "lecturettes" on prehistoric times and the severance of Britain form part of the contents of the first number. Giraffes in the British Museum, with a (not absolutely accurate) transcript of the accompanying label, form the subject of another section.

In connection with the study of the occurrence of glycogen and paraglycogen in fungi, the late Prof. Errera compiled a bibliography of the subject. The list of papers with his abstracts on their contents is published in *Recueil de l'Institut botanique*, Brussels, vol. i., 1905.

In the *Bulletin du Jardin impérial botanique*, vol. vi., part ii., Madame O. Fedtschenko writes a note on species of *Eremurus* in which she refers the species *Eremurus Aucherianus* and *Eremurus Korolkowi* from Turkestan to *Eremurus anisopterus* and other species. Mr. V. Archiovskij discusses the size of plants as a specific character.

To replace the list of ferns and fern-allies cultivated in the Royal Gardens, Kew, issued in 1895 and now out of print, a second edition compiled by Mr. C. H. Wright has been published. The plants are enumerated under the three groups of ferns, fern-allies, and cultivated forms of British ferns. The table of fern-distribution throughout the world, drawn up by Mr. J. G. Baker for the previous edition, has been revised, showing a considerably increased percentage for temperate Asia.

A DETAILED account of the distribution of the forest flora of the Bombay Presidency and Sind has been contributed by Mr. W. A. Talbot to the *Indian Forester* (January to March). Mr. Talbot distinguishes an evergreen forest flora of Malabar showing a decided Malayan affinity, a Deccan dry deciduous flora in which African elements predominate, and the flora of the Western Ghats and Konkan, in which there is a mixture of high deciduous and evergreen forests. The dry Deccan flora includes such typical species as *Zizyphus jujuba*, *Acacia catechu*, *Sterculia urens*, and *Bombax malabaricum*. Myristicas, Dipterocarpaceae, laurels, and palms are characteristic of the tropical evergreens.

THE Bulletin of the Johns Hopkins Hospital for May (xvii., No. 182) is mainly devoted to medical subjects. Dr. Cushing contributes an interesting article on a course of instruction in operative medicine, and Dr. Pratt one on the home sanatorium treatment of consumption, in which the problem of applying the open-air treatment of tuberculosis in the homes of the poor is dealt with. The proceedings of the Johns Hopkins Historical Club are devoted to a "symposium" of the "gold-headed" cane, a stick

or cane, now in the possession of the Royal College of Physicians of London, which made its appearance in medical circles about the year 1689, and for one hundred and thirty-six years was carried by a leading London practitioner, including John Radcliffe, Richard Mead, Anthony Askew, William Pitcairn, and Matthew Baillie, all well-known names in medical history.

WE have received from Mr. Herbert Kynaston, director of the Transvaal Geological Survey, a copy of his memoir on the geology of the Komati Poort coalfield (Pretoria, 1906, price 7s. 6d.). It covers 55 pages, and constitutes the second of the series of descriptive memoirs which it is the intention of the Geological Survey to issue from time to time. It is an admirable piece of work, giving a connected account of the character, behaviour, and distribution of the coal-bearing strata of the Komati Poort district. A description is also given of the associated sedimentary and igneous rocks. Apart from the prevalence of intrusive sheets and dykes of igneous rock throughout the coal-bearing strata, the conditions are favourable, and no evidence was observed of the beds having been disturbed by faulting in a manner that would be discouraging to mining operations. The actual Coal-measure series occupy 150 square miles, and the great thickness of the coal-bearing strata, and the favourable situation of the better portion of the field, render the prospects eminently satisfactory. The memoir is accompanied by two coloured geological maps and six sections, and six photographic views giving an excellent idea of the character of the scenery on the Crocodile and Komati rivers.

SOME valuable results of an experimental investigation on the effect of fire on building stones were described by Mr. W. R. Baldwin-Wiseman at a meeting of the Surveyors' Institution on May 14. The purpose of the research was not so much to determine the design of a building for fire resistance as to estimate the ultimate stability of an edifice after subjection to a severe conflagration, and to afford some small assistance to those who may be called upon to decide whether demolition or reconstruction shall succeed the wrecking influences of a big conflagration. The points of primary importance in determining the most efficient design for fire resistance are summarised as follows:—(1) That the edifice should in no wise be flimsy; (2) that it should be constructed of stone possessing a uniform or fairly uniform coefficient of expansion, and retaining a considerable strength after subjection to high temperatures; (3) that all combinations of different stones should be avoided as much as possible; (4) that combinations of stone and metal should be avoided, especially when the former rests directly upon the latter, even when the metal is entirely enshrouded in stone, for stone acts as a fairly good conductor of heat; (5) that stair wells and lift wells should open as little as possible on to the main building, and should preferably be enclosed and glazed with wired glass from basement to roof; (6) that floor areas should not be unduly large or corridors unduly long.

THE first parts of two serial publications, issued by Messrs. Cassell and Co., Ltd., have been received. A new edition of Prof. G. S. Boulger's "Familiar Trees" is to be completed in twenty-nine fortnightly parts, and will contain 114 coloured plates and 114 illustrations from photographs. Mr. W. F. Kirby's "Butterflies and Moths of Europe" will be published in thirty-two instalments at fortnightly intervals; and the completed volume, with its large pages and fifty-four coloured plates, will form an attractive addition to the naturalist's reference library.

MR. T. FISHER UNWIN has published a second edition of "Methods in Plant Histology," by Dr. C. J. Chamberlain, of the University of Chicago. The first edition of the book appeared in 1901, and was reviewed in our issue of November 28, 1901 (vol. lxx., p. 75). It is only necessary to say of the present edition that more attention has been given to the collection of materials. Prof. Kleb's methods for securing various reproductive phases in the algæ and fungi have been outlined, and methods for growing other laboratory material are more complete. New chapters dealing with microchemical tests, free-hand sections, special methods, and the use of the microscope are included.

OUR ASTRONOMICAL COLUMN.

SUN-SPOT AND CHROMOSPHERIC SPECTRA.—A paper of exceptional interest to workers in solar physics was read by Prof. A. Fowler at the April meeting of the Royal Astronomical Society.

Whilst observing the bright lines in the spectra of metallic prominences on the sun's limb, Prof. Fowler has been able to classify them into "long" and "short" lines, a fact which points to their origin being in the higher and the lower chromosphere respectively; he also states the fact that the lines emitted by the upper chromosphere, the "long" lines, are those which, speaking generally, are enhanced when passing from the arc to the spark in terrestrial spectroscopy.

Further, Prof. Fowler found that these long lines are generally *weakened* in sun-spot spectra, whilst the short lines are generally widened, or *strengthened*. The evidence for this differential treatment of "enhanced" and "arc" lines in the solar atmosphere is most conclusive for the elements iron, titanium, and chromium (the *Observatory*, No. 370).

PROPOSED DAILY PHOTOGRAPHS OF CHROMOSPHERIC RADIATIONS.—A paper by M. Deslandres, which is published in the *Comptes rendus* for May 7, discusses in detail the possibility of obtaining daily photographs of the radiations emitted by the solid and liquid particles of the chromosphere, without waiting for the rare occasions afforded by total eclipses of the sun.

In order to do this M. Deslandres proposes to employ an apparatus similar to that used by him for the same purpose during the last eclipse, and to obtain a concentrated image of the chromosphere, without the photosphere, by a special arrangement of mirrors and lenses.

If the coloured screens are insufficient, it is suggested that the spectroheliograph might be employed. By obtaining the ordinary spectroheliograms with K_1 and K_2 , and then another in which the bright interspaces, i.e. the continuous spectrum, were projected on to the primary slit, it would be possible to separate the parts due to the particles from those parts of the chromospheric radiations due to permanent gases.

M. Deslandres further suggests that the same methods, if successful in this instance, might be employed for the analysis of the structure of other celestial bodies such as nebulae and comets.

STARS WITH VARIABLE RADIAL VELOCITIES.—A list of four stars the radial velocities of which have been found to be variable is published by Mr. J. H. Moore in No. 3, vol. xxiii., of the *Astrophysical Journal*.

The radial velocity of τ Ursæ Majoris has been found to vary between -1 km. and -10 km., that of λ Hydræ between $+15$ km. and $+24$ km., and that of μ Ursæ Majoris between -16 km. and $+27.4$ km. In the case of γ Ophiuchi, discovered to be a spectroscopic binary by Mr. S. Albrecht, the variation of the velocity is found to agree, in point of time, with the light variation, both having the period 17.12 days.

Four other spectroscopic binaries with variable velocities are announced by Prof. Frost in the same journal. The first two, B.D. $-1^{\circ}.1004$ and 29 Canis Majoris, are remarkable for the long range of their velocities and their short periods. In the former of these two, the radial velocity changed from $+132$ km. on February 12 to

-34 km. on February 16, whilst that of the second star changed as follows:—1906 January 26, -164 km.; January 29, -3 km.; February 12, -243 km.; February 16, -92 km. Owing to under-exposure, these results are, however, slightly uncertain.

The stars μ Orionis and T Monocerotis have also been shown to have variable velocities in the line of sight.

OBSERVATIONS OF NOVA PERSEI No. 2.—No. 96 of the Lick Observatory Bulletins is devoted to the publication of the results obtained by Messrs. Townley and Maddrill from magnitude observations of Nova Persei No. 2.

The observations extended over the period February 24, 1901, to July 5, 1902, the magnitude on the latter date being 9.4.

The table given contains the weighted, mean magnitudes of the Nova on more than one hundred nights, with notes on the observing conditions and the comparison stars and instruments employed.

OBSERVATIONS OF SHADOW BANDS.—In No. 4086 of the *Astronomische Nachrichten* Dr. M. Roso de Luna, of Madrid, briefly describes a new arrangement of screens for the observation of the shadow bands during total eclipses of the sun. Altogether he proposes to employ six screens, one horizontal, two vertical (N. and S. and E. and W.), one oriented to the azimuth of the sun at the moment of totality and another perpendicular to it, and one placed in the direction of the wind.

Such an arrangement was employed at Soria (Spain) during the last eclipse, and the following results obtained:—breadth of bands, 2 cm.; distance from one band to the next, 6 cm.; velocity of the movement of the bands, 30 metres per minute.

THE RADIAL MOTION OF β ARIETIS.—In No. 4090 of the *Astronomische Nachrichten* Herr H. Ludendorff publishes the results obtained from an investigation of the radial velocities of β Arietis during the period October 21, 1902, to December 16, 1904.

Thirty-seven spectrograms were obtained with the spectrograph No. iv. (three prisms) of the Potsdam Observatory attached to the 32.5 cm. refractor, and the range of the velocities determined was from $+60$ km. (on January 19, 1903) to -17 km. (on December 25, 1903).

From an analysis of the results, Herr Ludendorff concludes that the period of β Arietis is $321/n$ days, where n is equal to or less than 5.

PUBLICATIONS OF THE NICOLAS OBSERVATORY, ST. PETERSBURG.—We have just received vols. iii. and xiv. (series ii.) of the "Publications de l'Observatoire central Nicolas, St. Petersburg."

The former contains a catalogue of right-ascensions of the principal stars contained in the Pulkowa catalogue for the epoch 1885.0, the results being based on observations made between September, 1880, and November, 1887, with the meridian telescope. The catalogue is published in the same form as those which appeared in 1845 and 1865.

Vol. xiv. contains a part of the results of the observations made with the vertical circle of the observatory between May 1, 1896, and May 19, 1899. The remaining part of the results and the discussion of the whole are reserved for the next volume (xv.) of the publications.

THE ROYAL OBSERVATORY, GREENWICH.

THE annual inspection of the Royal Observatory, Greenwich by the Board of Visitors took place on Wednesday, May 30, when the Astronomer Royal submitted a report of the work accomplished during the twelve months May 11, 1905, to May 10, 1906. A brief summary of this report is given below.

The new working catalogue of stars of the ninth magnitude and brighter, situated between declinations $+24^{\circ}$ and $+32^{\circ}$, is now complete, and includes more than 12,000 stars; the star-places have all been accurately brought up to 1910 from the *Astronomische Gesellschaft* catalogues.

A new determination of the pivot errors of the transit instrument, made during November, showed that the errors in the form of the pivots are insensible. The determination of the co-latitude for 1905 has been delayed by the necessity